

**Syllabus**  
**B. Sc. (Ag) Hons. Part-III, Semester-I**  
**Agriculture University, Jodhpur**

**Courses & Credits**

<b>Course No.</b>	<b>Course Title</b>	<b>Credits</b>
BT-4311	Principles of Plant Biotechnology	3(2+1)
AGRON-4311	Practical crop production I (kharif crops)	1(0+1)
ENTO-4311	Crop and stored grain pests and their management	4(3+1)
PBG-4311	Breeding of Field / Horticultural crops	3(2+1)
AECON-4311	Agricultural marketing, Trade and Prices	2(1+1)
AENGG-4311	Protected cultivation and Post harvest Technology	2(1+1)
PPATH-4311	Diseases of Field Crops and their management	3(2+1)
AGRON-4312	Rainfed Farming	2(1+1)
HORT-4311	Production technology of spices, Aromatics and Medicinal crops	2(1+1)
	<b>Total</b>	<b>22(13+9)</b>



# Syllabus

## **B. Sc. (Ag) Hons. Part-III, Semester-I**

### **Agriculture University, Jodhpur**

**BT-4311**

**Principles of Plant Biotechnology**

**3(2+1)**

**Theory:**

Concepts of Plant Biotechnology: History of Plant Tissue Culture and Plant Genetic Engineering: Scope and importance in crop Improvement : Totipotency and Morphogenesis, Nutritional requirements of in vitro cultures; Techniques of in vitro cultures, Micropropagation, anther culture, pollen culture, ovule culture, embryo culture, Test tube fertilization, Endosperm culture, factors effecting above in vitro cultures, Applications and achievements, somaclonal variation, Types, Reasons, somatic embryogenesis and synthetic seed production technology, Protoplast isolation, culture, manipulation and fusion, Products of somatic hybrids and cybrids, Applications in crop improvements, Genetic Engineering, Restriction enzymes, Vectors for gene transfer-, gene cloning, Direct and Indirect method of gene transfer-Transgenic plants and their applications. Introductory knowledge about blotting techniques, molecular markers, QTL, Marker assisted selection and application in crop improvement.

**Practical:**

Requirements of Plant tissue culture laboratory: Techniques in Plant tissue culture- Media Components and preparation; sterilization techniques and inoculation of various explants, callus induction and plant regeneration; Demonstration of Micropropagation, Anther culture, embryo culture, Hardening/ Acclimatization of regenerated plants, somatic embryogenesis and synthetic seed production, Demonstration of isolation and culture of protoplast, demonstration of isolation of DNA, gene transfer technique and gel electrophoresis techniques.

**Suggested Readings:**

1. Brown, T.A.2001 gene cloning and DNA Analysis-An Introduction, Blackwell Science, London
2. Gupta, P.K.2006. Biotechnology and Genomics, Rastogi Publication, Meerut
3. Prohit, S.S.1997, Biotechnology, Agrobotanical Publication Bikaner
4. Rajdan, M.K.1996, An introduction to, plant tissue culture, Oxford and IBH Publishing Company, New Delhi
5. Ramawat, K.G. 2000, Plant Biotechnology, Kalyani Publishers, Ludhiana
6. Mascarenhas, A.F. 1991. Handbook of Plant Tissue Culture, Publications and Information Division, ICAR, New Delhi.

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**Syllabus**  
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**Agriculture University, Jodhpur**

**AGRON- 4311**

**Practical Crop Production -1(Kharif crops)**

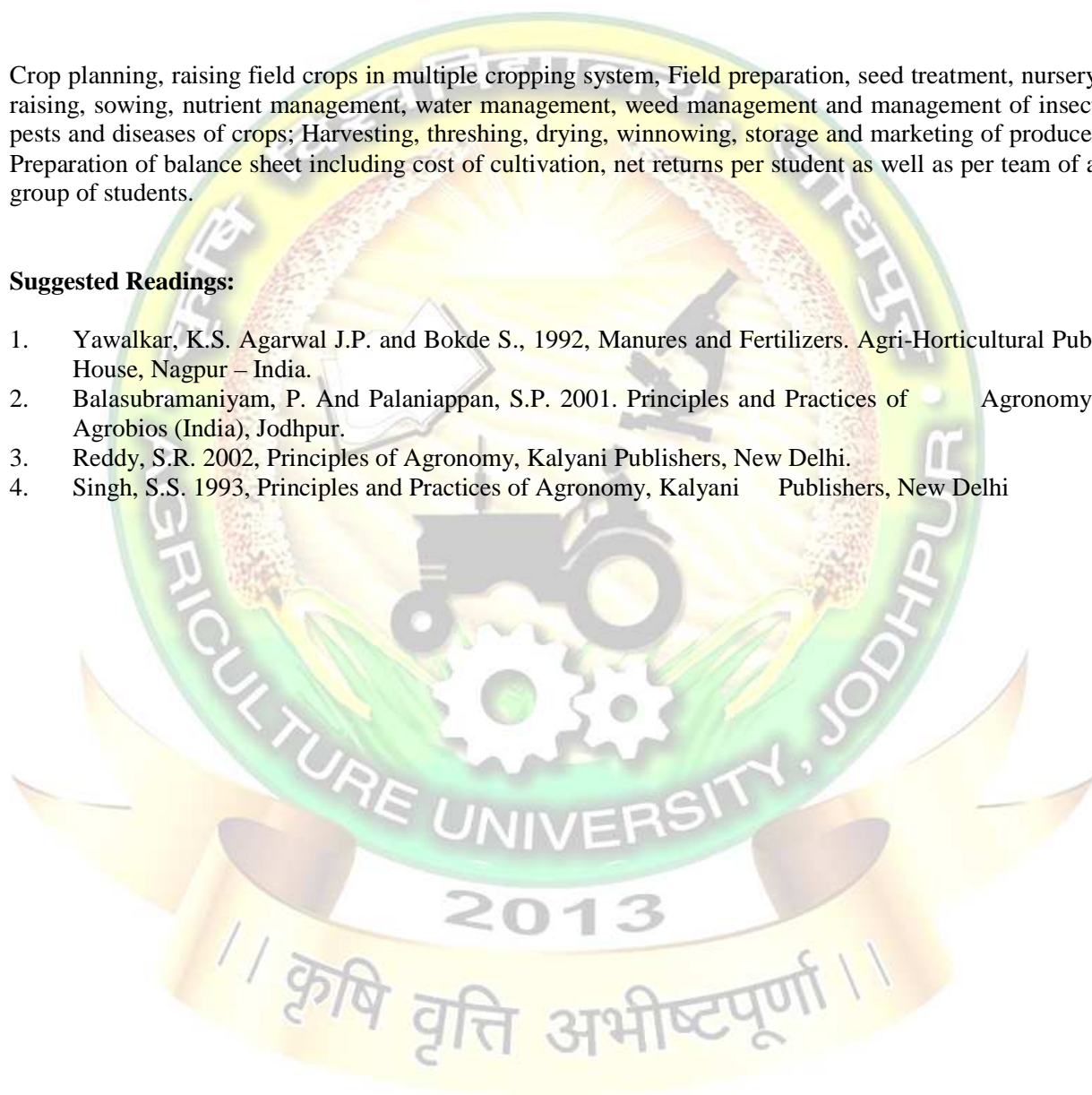
**1(0+1)**

**Practical:**

Crop planning, raising field crops in multiple cropping system, Field preparation, seed treatment, nursery raising, sowing, nutrient management, water management, weed management and management of insect pests and diseases of crops; Harvesting, threshing, drying, winnowing, storage and marketing of produce. Preparation of balance sheet including cost of cultivation, net returns per student as well as per team of a group of students.

**Suggested Readings:**

1. Yawalkar, K.S. Agarwal J.P. and Bokde S., 1992, Manures and Fertilizers. Agri-Horticultural Pub. House, Nagpur – India.
2. Balasubramaniam, P. And Palaniappan, S.P. 2001. Principles and Practices of Agronomy, Agrobios (India), Jodhpur.
3. Reddy, S.R. 2002, Principles of Agronomy, Kalyani Publishers, New Delhi.
4. Singh, S.S. 1993, Principles and Practices of Agronomy, Kalyani Publishers, New Delhi



# Syllabus

## **B. Sc. (Ag) Hons. Part-III, Semester-I**

### **Agriculture University, Jodhpur**

**ENTO- 4311**

**Crop and Stored Grain Pests and Their Management**

**4 (3+1)**

**Theory:**

Polyphagous pests: Red hairy caterpillar, White grub, Termite, Locust, Grasshopper.

Crop pests: Distribution, biology, nature and symptoms of damage, and management of insect pests of rice, pearl millet, sorghum, maize, wheat, sugarcane, cotton, pulses (Gram and *Kharif* pulses), groundnut, castor, sesame, sunflower, mustard, soybean, brinjal, okra, tomato, cruciferous and cucurbitaceous vegetables, potato, chillies, onion, garlic, mango, citrus, pomegranate, guava, ber, apple, coconut and ornamental plants.

Stored grain pests: Coleopteran and Lepidopteran pests, their identification, biology and damage. Preventive and curative methods for control of stored grain pests.

**Practical:**

Identification, damage symptoms and management of insect pests of rice, pearl millet, sorghum, maize, wheat, sugarcane, cotton, pulses, castor, mustard, brinjal, tomato, okra, cruciferous and cucurbitaceous vegetables, onion, garlic, chillies, mango, guava, citrus, pomegranate, ber, coconut. Identification, biology, damage symptoms and management of stored grain and polyphagous insect pests.

**Suggested Readings:**

- 1 Atwal, A.S. and Dhaliwal, G.S. 2002. Agricultural Pests of South Asia and Their Management, Kalyani Publishers, New Delhi.
- 2 David B.V. 2003. Elements of Economic Entomology, Popular Book Depot, Chennai
- 3 Pradhan, S. 1968. Insect Pests of Crops, National Book Trust, New Delhi
- 4 Nayar, M.R.G.K. 1986. Insects and Mites of Crops in India, ICAR, New Delhi.
- 5 Srivastava, K.P. 2004. A Text Book of Entomology, Vol.II, Kalyani Publishers, New Delhi.
- 6 Khare, B.P. 1994. Stored Grain Pests and Their Management, Kalyani Publishers, New Delhi

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# Syllabus

## **B. Sc. (Ag) Hons. Part-III, Semester-I**

### **Agriculture University, Jodhpur**

**PBG 4311**

**Principles of Plant Biotechnology**

**3 (2+1)**

**Theory:**

Concepts of Plant Biotechnology : History of Plant Tissue Culture and Plant Genetic Engineering : Scope and importance in Crop Improvement : Totipotency and Morphogenesis, Nutritional requirements of in-vitro cultures; Techniques of In-vitro cultures, Micropropagation, Anther culture, Pollen culture, Ovule culture, Embryo culture, Test tube fertilization, Endosperm culture, Factors affecting above in-vitro culture; Applications and Achievements; Somaclonal variation, Types, Reasons, Somatic embryogenesis and synthetic seed production technology; Protoplast isolation, Culture, Manipulation and Fusion; Products of somatic hybrids and cybrids, Applications in crop improvement; Genetic engineering; Restriction enzymes, Vectors for gene transfer, Gene cloning, Direct and indirect method of gene transfer – Transgenic plants and their applications. Introductory knowledge about blotting techniques, molecular markers, QTL, Marker assisted selection and application in crop improvement.

**Practical:**

Requirements for plant Tissue Culture Laboratory : Techniques in plant Tissue Culture – Media components and preparation; Sterilization techniques and inoculation of various explants, callus induction and plant regeneration; Demonstration of Micropropagation, Anther culture, embryoculture, Hardening/Acclimatization of regenerated plants, somatic embryogenesis and synthetic seed production; Demonstration of isolation and culture of protoplast; Demonstration of isolation of DNA, gene transfer technique and gel electrophoresis techniques.

**Suggested Readings:**

1. Brown, T.A. 2001 Gene Cloning and DNA analysis – An Introduction. Blackwell Science. London.
2. Gupta, P.K. 2006 Biotechnology and Genomics. Rastogi Publication, Merrut.
3. Purohit, S.S. 1997. Biotechnology. Agro Botanical Publication. Bikaner.
4. Rajdan, M.K. 1996 An Introduction to Plant Tissue Culture. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.
5. Ramawat, K.G. 2000. Plant Biotechnology. S. Chand and Company, New Delhi.
6. Singh, B.D. 2001. Biotechnology. Kalyani Publishers. Ludhiana.
7. Mascarenhas, A.F. 1991. Handbook of plant tissue culture. Publications and information division, ICAR, New Delhi.

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**B. Sc. (Ag) Hons. Part-III, Semester-I**  
**Agriculture University, Jodhpur**

AGECON- 4311

Agricultural Marketing, Trade and Prices

2 (1+1)

**Theory:**

Agricultural Marketing: Concepts and Definition, Scope and subject matter, Market and Marketing: Meaning, Definitions, Components of a market, Classification. Market structure, Conduct, performance. Marketing structure, Market functionaries or agencies, Producer's surplus: Meaning, Types of producers surplus, marketable surplus. Marketed surplus, importance, Factors affecting Marketable surplus. Marketing channels: Meaning, Definition, Channels for different products. Market integration, Meaning, Definition, Types of Market Integration. Marketing efficiency: Meaning, Definition, Marketing costs, Margins and price spread, Factors affecting the cost of marketing, Reasons for higher marketing costs of farm commodities, Ways of reducing marketing costs. Theories of International Trade: Domestic Trade, Free trade, International Trade, GATT, WTO, Implications of AOA. Market access, Domestic support, Export subsidies, EXIM-Policy & Ministerial conferences. Cooperative Marketing. State Trading. Ware Housing Corporation; Central and State, Objectives, Functions, Advantages. Food Corporation of India: Objectives and Functions. Quality Control, Agricultural Products, AGMARK. Price Characteristics of agricultural product process, Meaning, Need for Agricultural Price Policy. Risk in Marketing: Meaning and importance, Types of Risk in Marketing. Speculations and Hedging, Futures trading, Contract farming.

**Practical:**

Identification of marketing channels; Study of Rythu Bazars, Regulated markets; Study of unregulated markets; Study of livestock markets; Price spread analysis; Visit to market institutions, NAFED; Study of SWC, CWC and STC; Analysis of information of daily prices; Marketed and marketable surplus of different commodities.

**Suggested Readings:**

1. S.S. Acharya and N.L. Agarwal (1987) Agricultural Marketing in India, Oxford & IBH, New Delhi
2. J.R. Moore, S.S. Johl and A.M. Khusro (1973) Indian Food Grain Marketing, Printice Hall, New Delhi
3. A.S. Kahlon & D.S. Tyagi (1983) Agricultural Price Policy in India, Allied Publishers, New Delhi
4. V.K. Bhall and S. Shiva Ramu (1996) International Business-Environment and Management, Anmol Publications (P) Limited, New Delhi

**Syllabus**  
**B. Sc. (Ag) Hons. Part-III, Semester-I**  
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**AENGG -4311**

**Protected Cultivation and Post Harvest Technology**

**2(1+1)**

**Theory:**

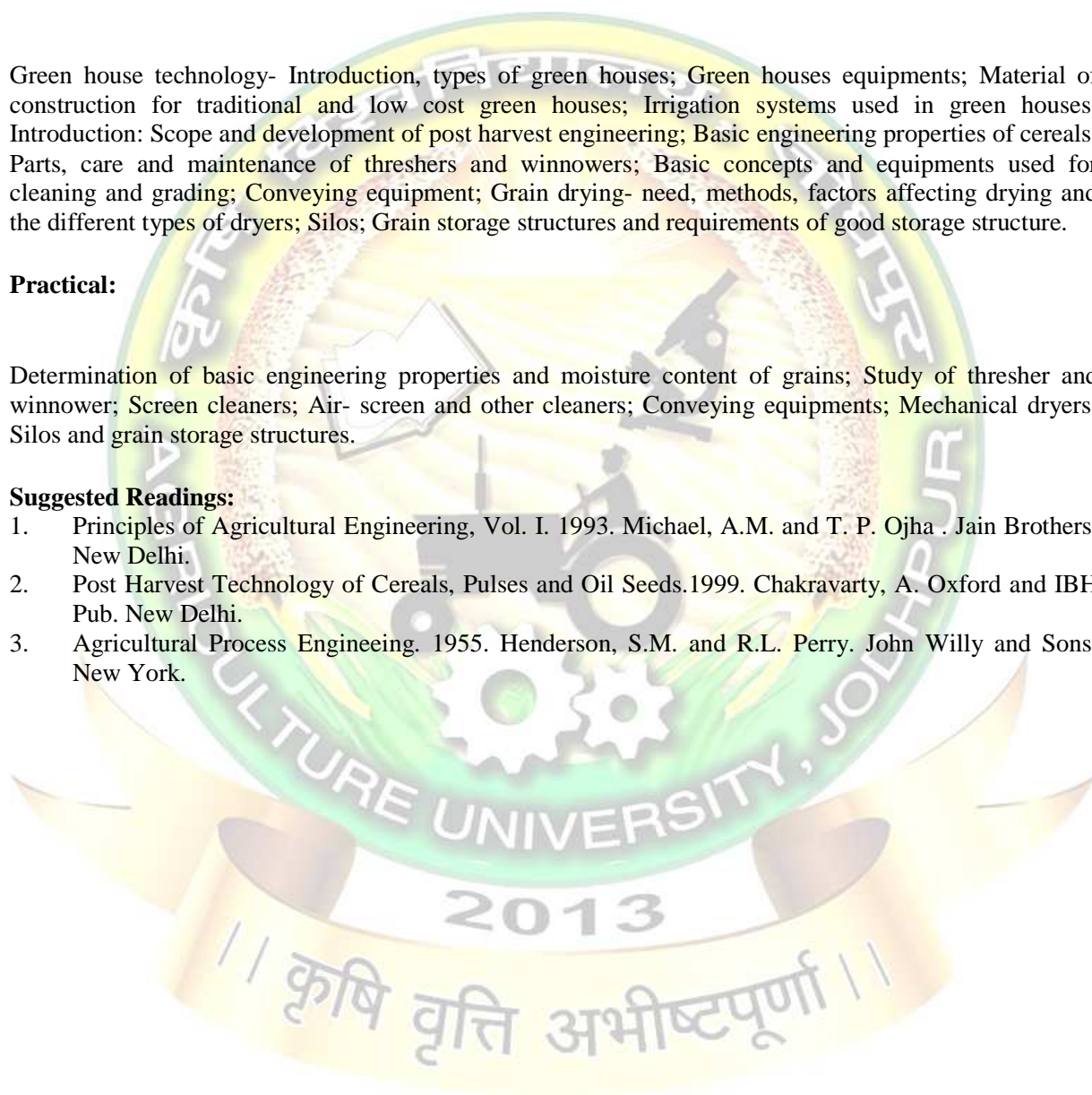
Green house technology- Introduction, types of green houses; Green houses equipments; Material of construction for traditional and low cost green houses; Irrigation systems used in green houses; Introduction: Scope and development of post harvest engineering; Basic engineering properties of cereals; Parts, care and maintenance of threshers and winnowers; Basic concepts and equipments used for cleaning and grading; Conveying equipment; Grain drying- need, methods, factors affecting drying and the different types of dryers; Silos; Grain storage structures and requirements of good storage structure.

**Practical:**

Determination of basic engineering properties and moisture content of grains; Study of thresher and winnower; Screen cleaners; Air- screen and other cleaners; Conveying equipments; Mechanical dryers; Silos and grain storage structures.

**Suggested Readings:**

1. Principles of Agricultural Engineering, Vol. I. 1993. Michael, A.M. and T. P. Ojha . Jain Brothers, New Delhi.
2. Post Harvest Technology of Cereals, Pulses and Oil Seeds.1999. Chakravarty, A. Oxford and IBH Pub. New Delhi.
3. Agricultural Process Engineering. 1955. Henderson, S.M. and R.L. Perry. John Willy and Sons, New York.



**Syllabus**  
**B. Sc. (Ag) Hons. Part-III, Semester-I**  
**Agriculture University, Jodhpur**

**P.PATH-4311**

**Disease of Field Crops and Their Management**

**3(2+1)**

**Theory:**

Economic importance , symptoms , etiology, disease cycle and management of diseases of **Wheat** (rusts, loose smut and Karnal bunt); **Barley** (covered smut and stripe disease); **Bengal gram** (Ascochyta blight and wilt); **Mustard** (white rust, Alternaria blight and white rot); **Rice** (blast, bacterial blight and khaira); **Maize** ( brown stripe downy mildew , sugarcane downy mildew and Fusarium stalk rot); **Sorghum** (grain smut , loose smut and anthracnose); **Bajra** (ergot, smut and downy mildew); **Sugarcane** (red rot, whip smut and grassy shoot disease); **Groundnut** (tikka and collar rot); **Cotton** (root rot ,bacterial blight and leaf curl); **Sesamum** (bacterial leaf blight and phyllody); **Pigeonpea** (wilt and sterility mosaic);**Clusterbean** (Alternaria blight); **Castor** (Fusarium wilt and bacterial blight); **Soybean** (bacterial pustule and charcoal rot); **Moth** and **Mungbean** (yellow mosaic virus).

**Practical:**

Study of symptoms, etiology, host-parasite relationship and control measures of diseases of wheat, barley, bengal gram, rice, maize, sorghum, bajra, sugarcane, groundnut, cotton, clusterbean, moth and mungbean. Visits of diseased field during the semester. Student should submit at least 25 pressed well mounted disease specimens.

**Suggested Readings:**

- 1 Cook A A 1981 . Diseases of tropical and sub-tropical field fiber and oil plants. Mac Millan Publishing Co. New York.
- 2 Gupta V K and Paul Y S (eds) 2002. Diseases of field crops. Indus Publishing Co. ND.
- 3 Mehrotra R S and Aggarwal A.2007.Plant Pathology (2<sup>nd</sup>.ed.) Tata McGraw-Hill Publishing Co Ltd. ND.
- 4 Mishra A ,Bohra A and Mishra A 2005. Plant Pathology. Agrobios. Jodhpur (India).
- 5 Rangaswamy ,G and Mahadevan,A .2001. Diseases of crop plants in India. Prentice hall of India Pvt Ltd ND.
- 6 Singh R S .2007 Plant Diseases.(8<sup>th</sup>.ed) Oxford and IBH Publishing Co.Pvt .Ltd .ND



# Syllabus

## **B. Sc. (Ag) Hons. Part-III, Semester-I**

### **Agriculture University, Jodhpur**

**AGRON- 4312**

**Rainfed Farming**

**2(1+1)**

#### **Theory:**

History of rainfed agriculture and its importance in India with particular reference to Rajasthan, extent of problem and constraints related to climate, soil, technological and socio-economic conditions; Delineating criteria for rainfed and drylands; Efficient utilization of water through soil and crop management practices- reducing water losses through mulching (use of mulching), Use of antitranspirants- their kind and mode of action and effect on crop yield; Increasing water storage by reducing run off and increasing infiltration through mechanical and cultural measures; Water harvesting techniques; Watershed management- its concept, objectives and principles; Integrated watershed management for drylands; Efficient management of rainfed crops- land preparation, seeding and crop density, selection of crops and varieties for dryland, alternate cropping and land use strategies, soil fertility management and fertilizer use techniques, weed control and intercultural operations, mid season corrections for mitigating the aberrant weather.

#### **Practical:**

Delineating criteria for rainfed and drylands; Onset and withdrawal of the monsoon, amount, intensity and distribution in Rajasthan and India ; Critical analysis of rainfall and estimation of moisture index and aridity index, crops and cropping systems for drylands; Acquiring skill in tillage methods for *in situ* moisture conservation, effects of soil mulching and its effect on soil moisture. Spray of antitranspirants on dryland crops and their effects on crops; Seed soaking and seed treatment with chemicals for sowing under moisture stress conditions, methods of fertilizer application in dry land areas; Effect of plant density, thinning, leaf removal on crop growth under moisture stress condition; Study of the salient features of a model water shed; Alternate land use strategies-- Agro-forestry, grass legume forage and alley cropping systems; Visit to dry land experiments ; to expose students to the latest agro-techniques and watershed management practices; Study of runoff plots and soil /nutrient losses.

#### **Suggested Readings:**

1. Singh, R.P. 1995, Sustainable Development of Dryland Agriculture in India. Scientific Publishers, Jodhpur.
2. Singh, S.S., 1993, Crop Management Under Irrigated and Rainfed Conditions, Kalyani Publishers, New Delhi.
3. De, G.C. 1989, Fundamentals of Agronomy Oxford and IBH Publishing Co., New Delhi.
4. Reddy, T.Y. and Reddi, G.H.S. 1992, Principles of Agronomy, Kalyani Publishers, New Delhi.
5. Dhruva Narayan, V.V.; Singh, R.P., Bhardwaj, S.P. Sharma, M. Sikka A.K., Vithal, K.P.R. and Das; S.K. 1947. Watershed Management for Drought Mitigation, ICAR Publication.
6. Murthy, J.V.S. 1994, Watershed Management Wiley, Eastern Limited, New Age International Limited, New Delhi.

**Syllabus**  
**B. Sc. (Ag) Hons. Part-III, Semester-I**  
**Agriculture University, Jodhpur**

**HORT- 4311 Production Technology of Spices, Aromatic and Medicinal Crops 2 (1+1)**

**Theory:**

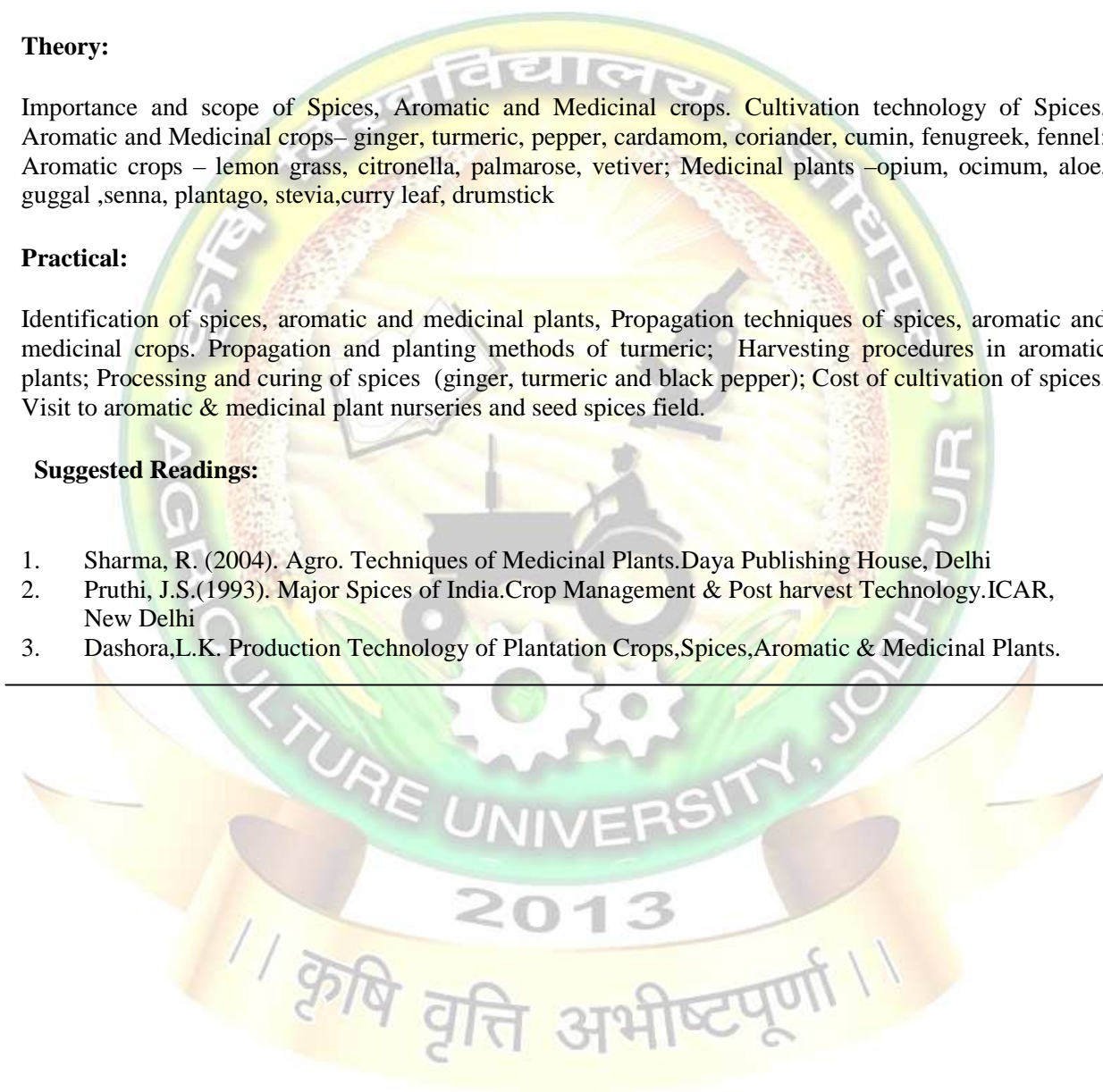
Importance and scope of Spices, Aromatic and Medicinal crops. Cultivation technology of Spices, Aromatic and Medicinal crops– ginger, turmeric, pepper, cardamom, coriander, cumin, fenugreek, fennel; Aromatic crops – lemon grass, citronella, palmarose, vetiver; Medicinal plants –opium, ocimum, aloe, guggal ,senna, plantago, stevia,curry leaf, drumstick

**Practical:**

Identification of spices, aromatic and medicinal plants, Propagation techniques of spices, aromatic and medicinal crops. Propagation and planting methods of turmeric; Harvesting procedures in aromatic plants; Processing and curing of spices (ginger, turmeric and black pepper); Cost of cultivation of spices. Visit to aromatic & medicinal plant nurseries and seed spices field.

**Suggested Readings:**

1. Sharma, R. (2004). Agro. Techniques of Medicinal Plants. Daya Publishing House, Delhi
2. Pruthi, J.S.(1993). Major Spices of India. Crop Management & Post harvest Technology. ICAR, New Delhi
3. Dashora, L.K. Production Technology of Plantation Crops, Spices, Aromatic & Medicinal Plants.



**Syllabus**  
**B. Sc. (Ag) Hons. Part-III, Semester-II**  
**Agriculture University, Jodhpur**

**Courses & Credits**

<b>Course No.</b>	<b>Course Title</b>	<b>Credits</b>
AGRON-4321	Practical crop production II (Rabi crops)	1(0+1)
PBG-4321	Principles of Seed Technology	3(2+1)
EXTED-4321	Extension Methodologies for Transfer of Agricultural Technology	2(1+1)
LPM-4321	Livestock Production and Management	3(2+1)
ENVS-4321	Environmental Science*	3(2+1)
AGRON-4322	Farming Systems, Sustainable Agriculture and Organic farming	3(2+1)
HORT-4321	Post harvest management and value addition of fruits and vegetables	3(2+1)
PPATH-4321	Disease of Horticultural crops and their management	2(1+1)
AECON-4321	Fundamentals of Agri. Business Management	2(1+1)
	<b>Total</b>	<b>22(13+9)</b>

\*Shall be shared between Biochemistry, Entomology and Soil Science



**Syllabus**  
**B. Sc. (Ag) Hons. Part-III, Semester-II**  
**Agriculture University, Jodhpur**

**AGRON- 4321**

**Practical Crop Production –II (Rabi)**

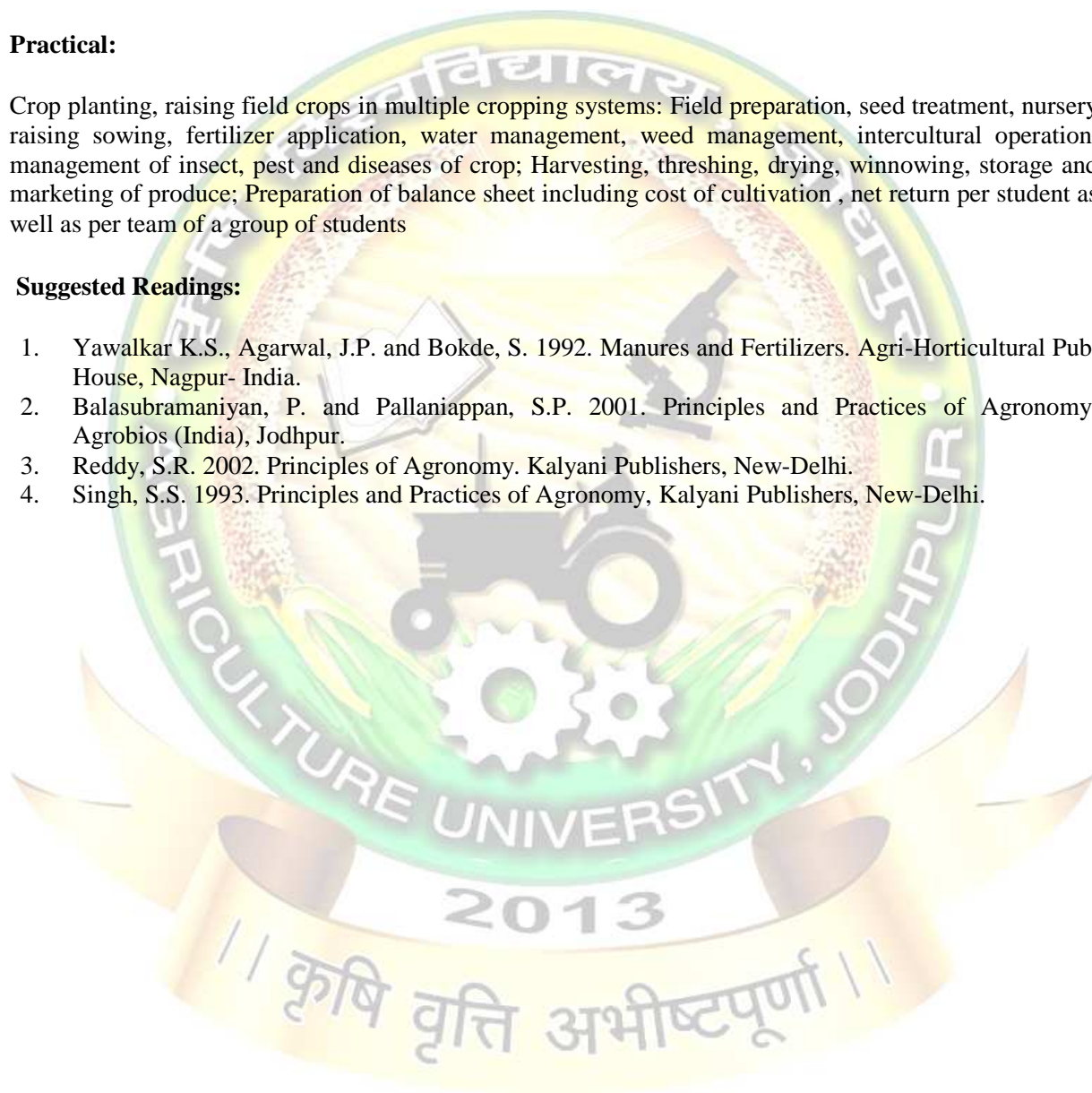
**1(0+1)**

**Practical:**

Crop planting, raising field crops in multiple cropping systems: Field preparation, seed treatment, nursery raising sowing, fertilizer application, water management, weed management, intercultural operation, management of insect, pest and diseases of crop; Harvesting, threshing, drying, winnowing, storage and marketing of produce; Preparation of balance sheet including cost of cultivation , net return per student as well as per team of a group of students

**Suggested Readings:**

1. Yawalkar K.S., Agarwal, J.P. and Bokde, S. 1992. Manures and Fertilizers. Agri-Horticultural Pub. House, Nagpur- India.
2. Balasubramanian, P. and Pallaniappan, S.P. 2001. Principles and Practices of Agronomy, Agrobios (India), Jodhpur.
3. Reddy, S.R. 2002. Principles of Agronomy. Kalyani Publishers, New-Delhi.
4. Singh, S.S. 1993. Principles and Practices of Agronomy, Kalyani Publishers, New-Delhi.



# Syllabus

## **B. Sc. (Ag) Hons. Part-III, Semester-II**

### **Agriculture University, Jodhpur**

**AGRON—4322 Farming Systems, Sustainable Agriculture and Organic Farming**

**3(2+1)**

#### **Theory:**

Sustainable agriculture: definition, current concept ; Factors affecting ecological balance and ameliorative measures; Land degradation and conservation of natural resources; Low external input agriculture (LEIA) & high external input agricultural (HEIA); Irrigation problems; Waste lands and their development; Differences between conventional and sustainable agricultural systems; Organic farming: definition, principles , components and relevance in present context; Organic production requirements; Biological intensive nutrient management-organic manures, vermicomposting, green manuring, recycling of organic residues, biofertilizers; Soil amendments; Integrated diseases and pest management – use of biocontrol agents, biopesticides, pheromones, trap crops, bird perches; Organic produce: quality considerations, certification, and accreditation; Farming systems: definition, principles and components, Integrated farming system (I F S) models for wetland, irrigated dryland and dryland situations.

#### **Practical:**

Preparation of cropping scheme for irrigated situations; Preparation of cropping scheme for dryland situations; Study of existing farming systems in nearby villages; Preparation of integrated farming system model for wetlands; Preparation of integrated farming system model for drylands; Preparation of enriched Farm Yard Manure; Preparation of Vermicompost; Study of profitable utilization of agricultural wastes; Visit to poultry and dairy units to study resource allocation, utilization and economics; Visit to an organic farm to study various components and utilization; Manurial requirement through vermicompost, FYM and poultry manure based on major nutrients; Estimation of organic carbon in organic manures; Technique for treating legume seed with *Rhizobium* and use of *Azotobactor* , *Azospirillum* and PSB in field crops ; Sustainable yield index and sustainable value index ; Productivity index of some important cropping sequences ; Raising of crops organically.

#### **Suggested Readings:**

1. Panda, S.C. 2004. Cropping Systems and Farming Systems, Agrobios (India), Jodhpur.
2. Sharma, Arun K. 2002. A Handbook of Organic Farming, Agrobios (India) Ltd., Jodhpur.
3. Balasubramanian, P. and Palaniappan, S.P. 2004. Principles and Practices of Agronomy, Agrobios (India) ,Jodhpur.
4. Shukla, Rajeev K. 2004. Sustainable Agriculture, Surbhee Publications, Jaipur.
5. Palaniappan, SP. 1985. Cropping Systgems in the Tro;ics : Principles and Management, Wiley Easter Ltd. And TNAU, Ciombatore.
6. Reddy, S.R. 2004. Principles of Agronomy, Kalyani Publishers, Ludhiana.
7. Palaniappan, S.P. and Sivraman, K. 1996. Cropping system in Tropics, International Pvt. New-Delhi.
8. Dahama, A.K. 1999. Organic Farming, Agro Botanica, Bikaner.
9. Sharma, Arun K. 2002. A Handbook of Organic Farming, Agrobios (India) , Jodhpur.
10. Palaniappan, S.P. and Anandurai, K. 1999. Organic Farming- Theory and Practice, Scientific Pub. Jodhpur.
11. Thapa, U and Tripathy, P. 2006. Organic farming In India: Problems and Prospects, Agrotech, Publishning Academy, Udaipur.
12. Gautam , R.C. and Singh, Punjab 1997. Tikau Kheti , Bhartia Krishi Anusandhan Parishad, New-Delhi.
13. Sharma, Arun , K. 2005 . Gevik Kheti- Sindant , Taknik and Upyogita. Agrobios, Jodhpur.

# Syllabus

## **B. Sc. (Ag) Hons. Part-III, Semester-II**

### **Agriculture University, Jodhpur**

**PBG- 4321**

**Principles of Seed Technology**

**3(2+1)**

#### **Theory:**

Importance of improved seed in agriculture. Seed technology – definition, objective, relationship with other sciences. Seed quality - definition, characters of good quality seed and classes of seed. Seed policy, Seed demand forecasting and planning for certified, foundation and breeder seed production. Deterioration of crop varieties, factors affecting deterioration and their control; Maintenance of genetic purity during seed production. Steps involved in development of seed programme and seed multiplication. Production of nucleus & breeder seed, Maintenance and multiplication of pre-release and newly released varieties in self-and cross-pollinated crops. Seed Production - foundation and certified seed production of maize, bajra, sorghum (hybrids, synthetics and composites), rice, cotton, tomato and hybrids; chillies and cucurbits (varieties and hybrids): Seed production of wheat, barley, gram and rapeseed mustard. Seed certification, phases of certification, procedure for seed certification and field inspection, field counts. Seed Act 1966 and Seed Act enforcement, Central Seed Committee, Central Seed Certification Board, State Seed Certification Agency. Central and State Seed Testing Laboratories; Duties and powers of seed inspectors, offences and penalties. Seed control order : Seed Control Order 1983. Intellectual Property Rights, Patenting, WTO, Plant Breeders Rights and Farmer's Right. Seed Drying - Forced air seed drying, principle, properties of air and their effect on seed drying, moisture equilibrium between seed and air. Seed processing - planning and establishment of seed processing plant; air screen machine and its working principle, different upgrading equipment and their use. Principles of seed treatment Seed storage; stages of seed storage, factors affecting seed longevity during storage and conditions required for good storage, general principles of seed storage. Seed marketing - marketing structure, marketing organization.

#### **Practical:**

Seed sampling principles and procedures; Physical Purity analysis of Field and Horticultural crops; Moisture test Germination analysis and viability test of Field and Horticultural crops; Vigour tests of Field and Horticultural crops; KOH and NaOH test for varietal identification; Visit of GOT fields at University farms. Visit to Seed production plots of University Farms. Visit to Seed processing plant; Seed testing laboratories; Varietal identification in seed production plots; Planting ratios, Minimum seed certification standards of important crops in the vicinity.

#### **Suggested Readings:**

1. Agarwal, R.L. 1991. Seed Technology, Oxford & IBH Publishing Co. Delhi.
2. Agarwal, P.K. 1999. Seed Technology, ICAR, New Delhi.
3. Subir Sen and Nabinanda Ghosh. 1999. Seed Science and Technology. Kalyani Publishers.
4. Dhiredra Khare and Mohan S. Bhale. 2000. Seed Technology. Scientific Publishers (India), Jodhpur.
5. Maloo, S.R., Intodia, S.K. and Pratap Singh. 2008. Beej Pradyogiki. Agrotech Publishing Academy.
6. A.K. Joshi and B.D. Singh. Seed Technology. 2005. Kalyani Publishers. New Delhi.

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## **B. Sc. (Ag) Hons. Part-III, Semester-II**

### **Agriculture University, Jodhpur**

**EXTED-4321 Extension Methodologies For Transfer of Agricultural Technology 2(1+1)**

#### **Theory:**

Communication - Meaning, Definition, Models, Elements and their Characteristics, Barriers in Communication. Extension Programme Planning - Meaning, Definition of Planning, Programme, Project, Principles and Steps in Programme Planning Evaluation - Meaning, concept and types. Extension Teaching methods - Meaning, Definition and Classification. Individual contact methods – Farm and Home visit, Telephone call, E-mail. Group contact methods – Group discussion, Method and Result demonstrations; Small group discussion techniques – Lecture, Panel, Workshop, Syndicate group, Brain Storming, Seminar, Conference and Buzz group. Mass contact Methods- Campaign, Exhibition, Kisan Mela, Radio & Television -Meaning, Importance, steps, Merits & Demerits. Factors influencing in selection of Extension Teaching methods. Innovative Information sources – Internet, Cyber Cafes, Video and Tele conferences, Kisan call centers. Diffusion-Meaning, Definition and Elements. Adoption Process-Meaning, Stages, Innovation decision process, Adopter categories and their characteristics, Factors influencing adoption process.

#### **Practical:**

Organization of Group discussion and Method demonstration. Planning and Writing of scripts for Radio and Television. Preparation of selected audio-visual aids- Charts, Posters, Over Head Projector(OHP) Transparencies, Power Point Slides. Leaflet, Folder, Pamphlet, News Stories and Success Stories. Handling of Public Address Equipment (PAE) System, Still Camera, Video Camera and Liquid Crystal Display (LCD) Projector.

#### **Suggested Readings:**

1. Das Gupta, S. 1989. Diffusion of agricultural Innovation in Indian Villages, Wiley Eastern Ltd., New Delhi.
2. Kumar, K.J. 2000. Mass Communication in India, Jaico Publishing House, 121 Mahatama Gandhi Road, Mumbai.
3. Mathur, K.B. 1994. Communication for Development & Social change, Allied Publisher Ltd., New Delhi.
4. Rogers, E.M. and Shoemaker, F.F. 1971. Communication of Innovations – A Cross cultural Approach, The Free Press, New York.
5. Sandhu, A.S.1993. Text book on Agricultural Communication : Process & Method, Oxford & IBH Publishing Co, Pvt. Ltd. New Delhi.
6. Reddy, A.A. 1993. Extension Education, Shri Laxmi Press, Bapatala.

**Syllabus**  
**B. Sc. (Ag) Hons. Part-III, Semester-II**  
**Agriculture University, Jodhpur**

**LPM-4321**

**Livestock Production and Management**

**3(2+1)**

**Theory:**

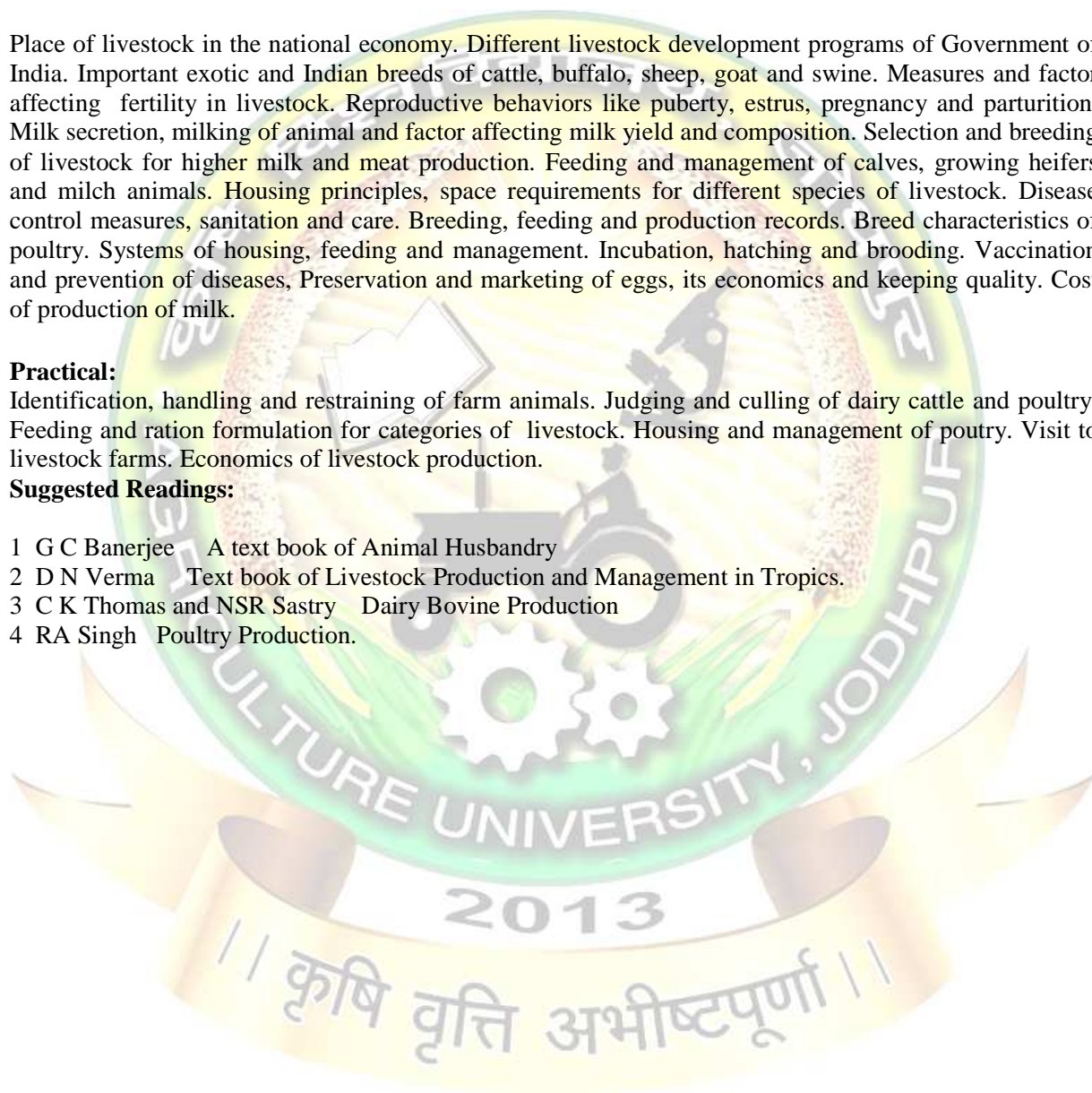
Place of livestock in the national economy. Different livestock development programs of Government of India. Important exotic and Indian breeds of cattle, buffalo, sheep, goat and swine. Measures and factor affecting fertility in livestock. Reproductive behaviors like puberty, estrus, pregnancy and parturition. Milk secretion, milking of animal and factor affecting milk yield and composition. Selection and breeding of livestock for higher milk and meat production. Feeding and management of calves, growing heifers and milch animals. Housing principles, space requirements for different species of livestock. Disease control measures, sanitation and care. Breeding, feeding and production records. Breed characteristics of poultry. Systems of housing, feeding and management. Incubation, hatching and brooding. Vaccination and prevention of diseases, Preservation and marketing of eggs, its economics and keeping quality. Cost of production of milk.

**Practical:**

Identification, handling and restraining of farm animals. Judging and culling of dairy cattle and poultry. Feeding and ration formulation for categories of livestock. Housing and management of poultry. Visit to livestock farms. Economics of livestock production.

**Suggested Readings:**

- 1 G C Banerjee A text book of Animal Husbandry
- 2 D N Verma Text book of Livestock Production and Management in Tropics.
- 3 C K Thomas and NSR Sastry Dairy Bovine Production
- 4 RA Singh Poultry Production.





# Syllabus

## **B. Sc. (Ag) Hons. Part-III, Semester-II**

### **Agriculture University, Jodhpur**

ENVS- 4321

**Environmental Science**

3(2+1)

#### **Theory:**

Scope and importance of environmental studies and biological chemistry. Renewable resources : Forest, Water, Food, energy and land - various environmental cycles viz. carbon, nitrogen and water etc. Energy flow in the ecosystem : concept of photosynthesis and respiration. Woman and child welfare – food, balance diet, vitamins and minerals etc. HIV/AIDS – viruses and nucleic acids, modification and propagation. Role of information technology on environment and human health – nutrition/malnutrition in communities. Concept of biological processing of industrial wastes. \*

Ecology : Definition and scope. Ecosystems: Definition, types, concept, structure, functions, components and food pyramids. Producers, consumers and decomposers of an ecosystem. Bio-diversity: Definition, classification, threats to biodiversity and its conservation. The Environment Protection Act, The Air Act, The water Act, The Wildlife Protection Act and Forest Conservation Act.\*\*

Environmental pollution: Causes, effects and control of air, water, soil, thermal, noise and marine pollution. Causes, effects and management of soil nuclear hazards and industrial wastes.\*\*\*

#### **Practical:**

Estimation of chlorophyll content of fresh water/sea water ecosystem. Study of transpiration and water balance in plants. Estimation of ascorbic acid (Vitamin C). Community survey for nutritional health status. Estimation of proline as stress indicator in plants. \*

Estimation of pesticide contamination in Agro-Ecosystem. Determination of sound level by using sound level meter. Estimation of respirable and non respirable dust in the air by using portable dust sampler. Estimation of species abundance of plants. Visit to ecosystems and study of biodiversity. \*\*

Collection, processing and storage of effluent samples; Determination of Bio-Chemical oxygen demand (BOD) in effluent sample; Determination of chemical oxygen demand (COD) in effluent sample; Estimation of dissolved oxygen in effluent samples; Determination of total dissolved solids (TDS) in effluent samples; Estimation of nitrate contamination in ground water. Analysis of temporary and total hardness of water sample by titration. Determination of heavy metals in sewage and sludge. \*\*\*

**\*Bio chemistry \*\* Entomology \*\*\* Soil science**

#### **Suggested Readings:**

1. Bamanayha B.R., Verma, L.N. and Verma A (2005). Fundamentals of Environmental Sciences, Yash Publishing House, Bikaner
2. Dhaliwal G.S., Sangha G.S. and Ralhan P.K. (2000) Fundamentals of Environmental Sciences, Kalyani Publishers, New Delhi
3. Odum E.P. and Barrett G.W.(2007) Fundamentals of Ecology, Brooks/Cole, Akash Press, New Delhi
4. Agrawal, K.C.(1999) Environmental Biology, Agro Botanica, Bikaner
5. Kumar, H.D.(1997) Modern concepts of Ecology, Vikash Publishing House Pvt. Ltd. New Delhi
6. Dhaliwal G.S., and D.S.Kley (2006) Principles of Agricultural Ecology. Himalyan Publishing house, Bombay
7. Brij Gopal, and N.Bhardwaj (2004) Elements of Ecology. Vikash Publishing House, Pvt. Ltd., New Delhi.
8. Fawler, F.B.(1961). Radioactive Fall out, Soils, Plants, Food, Man (Ed.) Elsevier Science, Netherland
9. Kudesta, V.P.(1990). Pollution Everywhere, Pragatgi Prakashan, Meerut
10. Nemerov, R.L.1976. Industrial Water Pollution. Addison Wesley
11. Page, R.A.I., Miller, H. and Keeney, D.R., (1992) Methods of Soil Analysis Part-2 (Ed.) American Soc. Agronomy Madison, Wisconsin, USA
12. Mishra, P.C.(2001). Soil pollution and Soil Organism, Ashish Publishing House, 8/81, Punjab Bagh, New Delhi – 110026.
13. Pathak, H.and Kumar, S.,(2003). Soil and Green House Effect, CBS Publishers and Distributors, 4596/1-A, 11, Dayaganj, New Delhi – 10002.

# Syllabus

## **B. Sc. (Ag) Hons. Part-III, Semester-II**

### **Agriculture University, Jodhpur**

**HORT- 4321 Post Harvest Management and Value Addition of Fruits and Vegetables**  
**3(2+1)**

**Theory:**

Importance of post harvest technology in horticultural crops. Maturity indices, harvesting and post-harvest handling of fruits and vegetables. Classification of fruit crops on the basis of ripening and ripening process. Factors affecting ripening of fruits and vegetables. Pre-harvest factors affecting quality on post-harvest shelf-life of fruits and vegetables. Factors responsible for deterioration of harvested fruits and vegetables. Chemicals used for hastening and delaying ripening of fruits and vegetables. Primary processing of fruits and vegetables. Methods of storage – pre-cooling, pre-storage treatments, low temperature storage, controlled atmospheric storage, hypobaric storage, irradiation and low cost storage structures. Various methods of packing, packaging materials and transport. . Importance and scope of fruit and vegetable preservation in India. Principles of preservation by heat, low temperature, chemicals and fermentation. Unit layout – selection of site and precautions for hygienic conditions of the unit. Preservation through canning, bottling, freezing, dehydration, drying, ultraviolet and ionizing radiations. Preparation of jams, jellies, marmalades, candies, crystallized and glazed fruits, preserves, chutneys, pickles, ketchup, sauce, puree, syrups, juices, squashes and cordials Spoilage of canned products, biochemical, enzymatic and microbial spoilage. Laws prohibiting processed fruit and vegetables food adulteration in India.

**Practical:**

Practice in judging the maturity of various fruits and vegetables. Construction of zero energy cool chambers for on farm storage. Determination of physiological loss in weight (PLW), total soluble solids (TSS), total sugars, acidity and ascorbic acid content in fruits and vegetables. Effect of ethylene on ripening of banana, sapota and mango. Identification of equipment and machinery used in preservation of fruits and vegetables. Preservation by drying and dehydration. Preparation of jam, jelly and marmalades. Preparation of squash, cordials and syrups. Preparation of chutneys, pickles, sauces and ketchup. Visit to processing units, market yards, cold storage units and packing industries.

**Suggested Readings:**

1. Srivastava, R. P. and Kumar, S. (2007). Fruits and Vegetables Preservation. Principle and Practices. International Book Distributing Comp., Lucknow
2. Lal, G., Siddapa, G.S. and Tandon, G.L. (1967). Fruit and vegetable Preservation in India. ICAR, New Delhi
3. Nair, S.S. And Sharma, H.C. (2006). Phal Tarkari Parikshan Praydhogiki. Rajasthan Hindhi Granth Academy, Jaipur

# Syllabus

## **B. Sc. (Ag) Hons. Part-III, Semester-II**

### **Agriculture University, Jodhpur**

**P.PATH. 4321**

**Diseases of Horticultural Crops and Their Management**

**2(1+1)**

#### **Theory:**

Economic importance, symptoms, etiology, disease cycle and management of diseases of **citrus** (canker, dieback); **mango** (malformation and black tip); **banana** (panama wilt and sigatoka); **grapevine** (downy mildew and anthracnose); **pomegranate** (bacterial blight); **papaya** (foot rot and ring spot); **guava** (wilt and Zn deficiency); **apple** (scab); **ber** (powdery mildew); **potato** (late blight and black heart); **tomato** (early blight and leaf curl); **chilli** (anthracnose); **brinjal** (Phomopsis blight and little leaf disease); **bhindi** (yellow vein mosaic); **pea** (powdery mildew); **cabbage** (black rot); **cucurbits** (downy mildew); **onion** (purple blotch); **ginger** (rhizome rot) and **rose** (powdery mildew).

#### **Practical:**

Study of symptoms, etiology, host-parasite relationship and control measures of diseases of citrus, mango, grapevine, pomegranate, papaya, guava, ber, potato, tomato, chilli, brinjal, bhindi, pea, onion. Field visits at orchards and vegetable fields during the semester.

Note: Student should submit at least 25 pressed well mounted disease specimens.

#### **Suggested Readings:**

- 1 Gupta, S.K. and Thind, T.S. 2006. Disease problems in vegetable production. Scientific Publishers, Jodhpur.
- 2 Mehrotra, R.S. and Aggarwal, A. 2007. Plant Pathology(2<sup>nd</sup>.ed.) Tata McGraw-Hill Publishing Co Ltd., New Delhi.
- 3 Pathak, V.N. 1980. Diseases of fruit crops. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
- 4 Godara, S.L., Kapoor, B.B.S. and Rathore B.S. 2010. Disease Management of Spice Crops. Madhu Publications. Bikaner (Raj.).
- 4 Rangaswamy, G. and Mahadevan, A. 2001. Diseases of crop plants in India. Prentice Hall of India Pvt Ltd., New Delhi.
- 5 Singh, R.S. 2006. Diseases of fruit crops. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.
- 6 Singh, R.S. 1994. Diseases of vegetable crops. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.
- 7 Singh, R.S. 2007. Plant Diseases. (8<sup>th</sup>.ed) Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.

# Syllabus

## **B. Sc. (Ag) Hons. Part-III, Semester-II**

### **Agriculture University, Jodhpur**

**AGECON-4321 Fundamentals of Farm Business Management (Including Project Development, Appraisal and Monitoring) 2(1+1)**

#### **Theory**

Agribusiness: Meaning, Definition, Structure of Agribusiness, (Input, Farm, Product Sectors). Importance of Agribusiness in the Indian Economy, Agricultural Policy. Agribusiness Management. Distinctive features, Importance of Good Management. Definitions of Management. Management Functions, Planning. Meaning, Definition, Types of Plans (Purpose or Mission, Goals or Objectives, Strategies, Policies, Procedures, rules, programmes, Budget) characteristics of sound plan, Steps in planning, Organisation. Staffing, Directing, Motivation, Ordering, Leading, Supervision, Communication, control. Capital Management. Financial Management of Agribusiness: Importance of Financial Statements, Balance sheet, Profit and Loss Statement, Analysis of Financial statements. Agro-based Industries: Importance and Need, Classification of Industries, Types of Agro-based Industries. Institutional arrangement, Procedure to set up agro-based industries, Constraints in establishing agro-based industries. Marketing Management: Meaning, Definitions. Marketing Mix. 4Ps of Marketing. Mix, Market segmentation, Methods of Market. Product life cycle. Pricing policy, Meaning, pricing method. Prices at various stages of Marketing. Project, definitions, project cycle. Identification, Formulation. Appraisal, Implementation. Monitoring and evaluation, Appraisal and Evaluation techniques, NPV, BCR, IRR, N/C ratio, sensitivity analysis. characteristics of agricultural projects: preparation of project reports for various activities in agriculture and allied sectors: Dairying, poultry, fisheries, agro-industries etc.

#### **Practical:**

Study of input markets: seed, fertilizers, pesticides. Study of output markets: grains, fruits, vegetables, flowers. Study of product markets: retail trade commodity trading, value added products. Study of financing institutions cooperatives commercial banks, RRBs. Agribusiness Finance Limited, NABARD: Preparations of projects. Feasibility reports; Project appraisal techniques: Case study of agro-based industries.

#### **Suggested Readings:**

1. C B Mamoria and Joshi. Principles and practice of Marketing in India
  2. S Subba Reddy and P Raghu Ram. Agricultural finance and Management.
  3. Kohls and Uhl. Marketing Agricultural Products.
  4. Kotler. Marketing Management.
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